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Young Scientist ESTRO (breast)

A dosimetric comparison between Helical Tomotherapy and three-dimensional conformal radiotherapy for stage IIIC breast cancer including internal mammary chain

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Backgruond. Three-dimensional conformal radiotherapy (3D-CRT) in the planning treatment of locorregional breast cancer including the internal mammary chain is realized, in our centre, by using tangential fields with multisegments; and PA-AP fields for nodal areas. Helical Tomotherapy (HT) is a sort of intensity-modulated radiation therapy, that uses an integrated CT scanner during radiation which is performed helicoidally.

Purpose. To compare the dosimetric distribution of two breast radiotherapy plans: three-dimensional conformal radiotherapy vs. Helical Tomotherapy.

Methods and materials. Six patients with stage IIIC breast cancer affecting internal mammary chain (clinically and/or histologically confirmed), were included in this study. For each patient, treatment plans were generated to compare the three-dimensional conformal radiotherapy (3D-CRT) against the Helical Tomotherapy (HT). CT simulation was performed in supine position with both arms above head and external rotation. The planning target volumes (PTV) included the chest wall/whole breast, supraclavicular, axillary, and internal mammary chain nodes. Dose prescription was 50.4 Gy, in 28 fractions of 1.8 Gy, to the PTV.

Results. The average V20 and V5 for heart was 7.28% and 84.94% for HT vs. 2.73% and 8.18% for 3D-CRT. The average V30, V20 and V5 for ipsilateral lung was 19.66%, 31.47% and 92.61% for HT vs. 33.78%, 38.41% and 54.82% for 3D-CRT. The average percentage of the contralateral lung receiving $\geq$5 Gy was 62.41% for HT and 2.86% for 3D-CRT. The average percentage of the contralateral breast receiving $\geq$5 Gy was 50.33% for HT and 8.18% for 3D-CRT.

Conclusion. Tomotherapy decreases high dose irradiation in lung at the expense of a greater volume of lung and heart receiving low-dose irradiation and higher irradiation of contralateral breast and lung. The choice of treatment plan must be individualized for each patient based on doses in heart, and contralateral breast and lung.

http://dx.doi.org/10.1016/j.rpor.2013.03.643

Application of artificial intelligence for breast cancer classification before radiatiotherapy

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Background. Despite the fact that electronic health records are currently more and more common, not all the information contained can be used in automatic process.

Aim. The objective of this study is to identify automatically the tumor size from the pathology reports before adjuvant radiation therapy for breast cancer.

Methods. Sixty-eight pathology reports of patients with breast cancer treated with adjuvant radiation therapy between January and April 2012 were used as a test dataset and 89 pathology reports from a different hospital were used as a validation set.

1507-1367/$ – see front matter

Three data mining algorithms (J48, LADtree, NaiveBayes) and a non-data mining based algorithm were used for classification. The selected reports were reviewed and annotated by 2 radiation oncologists according to the 7th edition TNM staging system. The rates of coincidence between the algorithms and the manual detection were assessed by the Cochran's Q test.
Results. The non-data mining based algorithm had the highest percentage of correctly classified cases running both the test dataset and the validation set (96% and 99%, respectively). There were significant differences between the results of the various algorithms used ($P = 0.001$). The reasons for the errors in the classification by the algorithms were mainly due to the lack of recognition of multifocal status and inflammatory disease.
Conclusions. This system based on artificial intelligence automatically enables the classification of tumor size in breast cancer. This tool would help saving time in the data collection, preventing errors, and improving tumor classification as well as the quality of the therapeutic decision.

http://dx.doi.org/10.1016/j.rpor.2013.03.644

Helical Tomotherapy for breast cancer stage IIIC including internal mammary chain

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Introduction. Radiation therapy is an integral part in the combined treatment of breast cancer. The benefit is well established in terms of both local control and survival endpoints. Helical Tomotherapy has been proposed as an alternative to standard 3D conformal radiotherapy.
Purpose. To evaluate dosimetric characteristics of Helical Tomotherapy for breast cancer radiotherapy.
Methods and materials. Nine patients with histologically proven breast cancer affecting internal mammary chain (clinically and/or histologically confirmed) stage IIIC, were included in this study. CT simulation scans were used to contour the planning target volumes (PTV) including the chest wall/breast, supraclavicular, axillary, and internal mammary lymph nodes. Dose prescription was 50/50.4, in 25/28 fractions of 2/1.8 Gy, to the PTV and treatment planning objectives were to cover at least 95% of the planning target volume with the 95% isodose. Beamlet entrance and/or exit throughout critical structures was blocked to protect the lungs, heart, and contralateral breast.
Results. Median homogeneity index (maximum dose/prescribed dose) was 1.23 (range 1.05–1.48). Median coverage index (minimum dose/prescribed dose) was 0.72 (range 0.54–0.9) Median V30, V20 and V5 for ipsilateral lung was 16.72% (range 0–26.5%), 30.8% (range 10.62–40%) and 97.6% (range 64.46–100%) respectively. Median V30, V20 and V5 for contralateral lung was 0% (range 0–0.48%), 0.095% (range 0–2.58%) and 49% (range 5.84–92.38%) respectively. Median V30, V20 and V5 for heart was 1.112% (range 0–4.6%), 4% (range 0.025–15.44%) and 96.52% (range 27.3–100%) respectively. Median V20, V10 and V5 for contralateral breast was 0% (range 0–0.37%), 1.25% (range 0.1–11.82%) and 28% (range 15.53–49.4%) respectively.
Conclusion. HT offers acceptable dose distribution. This technique achieves high homogeneity and conformality, and reduces the hot-spots in organs at risk although increasing the low dose areas However clinical advantage of using HT in breast cancer is unknown. Further studies of long monitoring period are required.

http://dx.doi.org/10.1016/j.rpor.2013.03.645

Immediate reconstruction and postmastectomy radiotherapy

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Introduction. Postmastectomy radiotherapy has an important role in terms of survival and quality of life in breast cancer. It has demonstrated superior locoregional control. Women who required RTPM represent a great reconstructive challenge. Optimal management of women who have undergone RTPM and reconstruction for breast cancer requires a multimodality approach. Breast reconstruction can be carried out immediate or delayed. The adequate decision is based on optimize outcomes and minimize complications. Despite patients who need radiation are more suitable for delayed reconstruction, in this study we analyze a series of patients treated with RT in our center who undergone immediate reconstruction.
Method. We studied twenty patients treated with postmastectomy radiotherapy who underwent immediate reconstruction and twenty patients without reconstruction from 2007 to 2012. The prescribed dose was 50 Gy in 25 fractions and those who received also boost was 16 Gy in 8 fr. The implant used was tissue expander and one was directly a prosthesis. The staging most frequently was III. The type of procedure was in all cases modified radical mastectomy and one simple mastectomy.
Results. The acute toxicity (1 month) was dermatitis Grade I and no toxicity at 6 months in the immediate reconstruction group and dermatitis G1 and G2 in the PMRT without reconstruction group, based in the toxicity criteria of the Radiation Oncology Therapy Group. There was nor infection neither deflation. In one of them was developed capsular contractured that required